

### Patent claims

1. An intervertebral implant (1) with a central axis (2), comprising
  - A) a bottom cover plate (3) and a top cover plate (4), each with an external surface (7, 8) extending transversely to the central axis (2),
  - B) a central part (10) with a sheathing (12) that surrounds a fibre system (5) provided between the cover plates (3, 4), wherein
  - C) the fibre system (5) is joined with the cover plates (3, 4) at least partially, characterised in that
  - D) the sheathing (12) comprises an elastic sheathing body (25) that surrounds the central part (10) on the periphery and is made from a homogeneous material and is passed through by the fibre system (5).
2. An intervertebral implant (1) according to claim 1, characterised in that the entire fibre system is embedded in the elastic sheathing body (25).
3. An intervertebral implant (1) according to claim 1, characterised in that the fibre system is only partially embedded in the elastic sheathing body (25).
4. An intervertebral implant (1) according to claim 3, characterised in that the fibre system (5) has a radial thickness  $\delta$  relative to the central axis (2) and the sheathing body (25) has a radial thickness  $d$ , and the  $\delta/d \times 100\%$  ratio is in a range between 80% and 350%.
5. An intervertebral implant (1) according to any one of claims 1 to 4, characterised in that the fibre system (5) can move relative to the sheathing body (25).
6. An intervertebral implant (1) according to any one of claims 1 to 4, characterised in that the fibre system (5) is so mounted that it cannot move relative to the sheathing body (25).

7. An intervertebral implant (1) according to any one of claims 1 to 6, characterised in that the entire fibre system (5) is joined with the cover plates (3, 4).
- 5 8. An intervertebral implant (1) according to any one of claims 1 to 7, characterised in that the sheathing body is made from an elastic, biocompatible material, preferably an elastomer, in particular based on polyurethane or silicone rubber, polyethylene, polycarbonate urethane or polyethylene terephthalate.
- 10 9. An intervertebral implant (1) according to any one of claims 1 to 8, characterised in that the central part (10) is filled at least partially with an incompressible medium.
10. An intervertebral implant (1) according to claim 9, characterised in that the incompressible medium is a liquid.
- 15 11. An intervertebral implant (1) according to claim 10, characterised in that the central part (10) comprises an incompressible liquid core (13) and an elastic formed body (9) provided around it.
- 20 12. An intervertebral implant (1) according to any one of claims 1 to 11, characterised in that the central part (10) has a cavity (11).
13. An intervertebral implant (1) according to any one of claims 1 to 12, characterised in that the fibre system (5) is mechanically anchored on or in the cover plates (3, 4).
- 25 14. An intervertebral implant (1) according to any one of claims 1 to 12, characterised in that the fibre system (5) is adhered to the cover plates (3, 4).
- 30 15. An intervertebral implant (1) according to any one of claims 1 to 12, characterised in that the central part (10) with the integrated fibre system (5) is joined with the cover plates (3, 4) in a form-locking manner.

16. An intervertebral implant (1) according to any one of claims 1 to 15, characterised in that the fibre system (5) is formed by an endless fibre, preferably in the form of a fabric or is knitted.
- 5 17. An intervertebral implant (1) according to any one of claims 1 to 16, characterised in that each cover plate comprises on its periphery a lateral surface (21, 22) and grooves (18) distributed on the circumference and radially penetrating into the lateral surfaces (21, 22) and that the fibre system (5) can be anchored in these grooves (18).
- 10 18. An intervertebral implant (1) according to any one of claims 1 to 17, characterised in that the fibre system (5) is guided over the external surfaces (7, 8) of both cover plates (3, 4) and surrounds the central part (10) as well as both cover plates (3, 4).
- 15 19. An intervertebral implant (1) according to claim 18, characterised in that channels (19) are mortised in the external surfaces (7, 8) of the cover plates (3, 4) to accommodate the fibre system (5).
- 20 20. An intervertebral implant (1) according to any one of claims 1 to 19, characterised in that the fibre system (5) is formed by a woven material.
- 25 21. An intervertebral implant (1) according to any one of claims 1 to 20, characterised in that the central part (10) is essentially hollow-cylindrical, hollow-prismatic or is in the form of a body of rotation, an ellipsoid, a partial sphere or barrel-shaped with an axis of rotation that is coaxial with the central axis (2).
- 30 22. An intervertebral implant (1) according to claim 20 or 21, characterised in that the woven material is formed from first and second fibres (6a, 6b), and the first fibres (6a) include an angle  $\alpha$  with the central axis (2) and the second fibres (6b) include an angle  $\beta$  with the central axis (2).

23. An intervertebral implant (1) according to claim 22, characterised in that the first and second fibres (6a, 6b) are interwoven with one another.
- 5 24. An intervertebral implant (1) according to any one of claims 11 to 23, characterised in that the elastic formed body (9) has at right angles to the central axis (2) a cross-sectional surface  $F_F$ , the central part has at right angles to the central axis (2) a cross-sectional surface  $F_M$  and the  $F_F/F_M$  ratio of these two cross-sectional surfaces is between 30% and 65%.
- 10 25. An intervertebral implant (1) according to any one of claims 22 to 24, characterised in that the angle  $\alpha$  is between  $15^\circ$  and  $60^\circ$ .
26. An intervertebral implant (1) according to any one of claims 22 to 25, characterised in that the angle  $\beta$  is between  $15^\circ$  and  $60^\circ$ .
- 15 27. An intervertebral implant (1) according to any one of claims 11 to 26, characterised in that the elastic formed body (9) is surrounded by a semi-permeable membrane and in the interior of the elastic formed body (9) preferably physiological table salt solution is present.
- 20 28. An intervertebral implant (1) according to any one of claims 1 to 27, characterised in that with regard to the central axis (2) the fibre system (5) is single-layered.
29. An intervertebral implant (1) according to any one of claims 1 to 27, characterised in that with regard to the central axis (2) the fibre system (5) is multi-layered, preferably 2-6 layered.
- 25 30. An intervertebral implant (1) according to any one of claims 11 to 29, characterised in that the fibre system (5) is wound on the elastic formed body (9).
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31. An intervertebral implant (1) according to claim 30, characterised in that the fibre system (5) is wound on the elastic formed body (9) in two different directions, preferably rotationally symmetrically.
- 5 32. An intervertebral implant (1) according to any one of claims 1 to 31, characterised in that the fibre system (5) is made from UHMWPE (ultra high molecular weight polyethylene).
- 10 33. An intervertebral implant (1) according to any one of claims 1 to 32, characterised in that a closing plate (14, 15) can be fastened on each cover plate (3, 4), the closing plate having at right angles to the central axis (2) an external surface (16, 17) with a macroscopic structure, preferably in the form of teeth.
- 15 34. An intervertebral implant (1) according to any one of claims 1 to 33, characterised in that the diameter of the fibres is in a range of 0.005 mm and 0.025 mm.